

Controller unit for solar thermal systems

medius 600 SR



Installation and operating instructions

English version of original German installation and operating instructions

Version: 1.1

December 2013

Terminology

In order to facilitate the use of the assembly and operating instructions, the following terminology will be used:

- These installation and operating instructions will hereinafter be designated as "Instructions".
- The medius 600 SR controller will hereinafter be designated as "Controller".
- The thermal solar power plant will hereinafter be designated as "Solar power plant".
- Freely definable Prozeda function modules, complete with selectable inputs and outputs, will hereinafter be designated as "Multi-function controllers" (MFC).
- Prozeda GmbH will hereinafter be designated as the "Manufacturer".

Declaration of conformity

We, Prozeda GmbH, hereby declare in sole responsibility that the product medius 600 SR complies with the following directives:

- Electromagnetic compatibility (2004/108/EC)
- Electrical equipment designed for use within certain voltage limits (2006/95/EC)
- CE marking (93/68/EEC).

Standards that were used:

- DIN EN 60730-1
- DIN EN 61326-1
- DIN EN 61326-2-2

This manual is designed to help you use the controller properly, safely and economically.

Target group

This manual is addressed to all persons who carry out any of the following tasks:

- Installing the controller
- Connecting the controller
- Putting the controller into operation
- Setting the controller
- Maintaining the solar power system
- Eliminating faults on the controller and the solar power system
- Disposing of the controller

These persons must have the following knowledge and skills:

- Knowledge about establishing electrical connections
- Knowledge about the hydraulic operation of solar power systems
- Knowledge of the applicable regulations at the point of use and the ability to apply them

These persons must have read and understood the contents of this manual.

Availability

This manual is part of the controller. Always keep it in an easily accessible location. Include this manual with the controller should the controller change hands.

If this manual gets lost or becomes unusable, you can contact the manufacturer for a new copy.

Style conventions used in the text


Specific style conventions are assigned to different elements in the manual. This makes it easy to recognise the type of text concerned:

Standard text,

"Menu", "Menu item", "Button designations",

- lists and

➤ actions.

 Notes accompanied by this symbol contain information about how to operate the controller economically.

Style conventions for hazard warnings

This manual makes reference to the following categories of hazard warnings:



DANGER

Information or instructions accompanied by the word DANGER provide a warning about a hazardous situation that will lead to fatal or serious injuries.



WARNING

Information or instructions accompanied by the word WARNING provide a warning about a hazardous situation that may possibly lead to fatal or serious injuries.



CAUTION

Information or instructions accompanied by the word CAUTION provide a warning about a situation that can lead to minor or moderate injuries.

Style conventions for warnings of damage to property or the environment

ATTENTION

Information and instructions of this kind provide a warning about a situation that can lead to damage to property or the environment.

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1 Safety

This chapter contains information on:

- the proper use of the controller and
- the safe use of the controller.

Read this chapter through carefully before you install, connect or operate the controller.

1.1 Proper use

The controller is used for monitoring and controlling a solar thermal system.

Appropriate use of the controller includes the following requirements:

- Use the controller exclusively in dry rooms in residential, commercial and/or industrial environments.
- Use only sensor connection boxes supplied by the manufacturer.
- Use the RS485 interface (ProBus) only for networking further devices from the manufacturer Prozeda.

The definition of proper use also encompasses observing and complying with all of the information contained in this manual - in particular compliance with all safety information and instructions.

Any other use, or any use exceeding the specifications, will be deemed to be improper use and may lead to personal injury or damage to property and shall render the warranty void.

Use of the controller in the following situations in particular is considered to be improper use:

- If you modify the controller independently and without prior authorisation
- If you operate the controller in a humid or wet environment

The manufacturer shall not be liable for damages arising from inappropriate use.

1.2 Basic safety information

This section contains basic safety information relating to working with the controller. You will find additional safety information relating to specific actions and workflows at the beginning of the section concerned.

Preventing risks of explosion

- Never use the unit in areas where there is a risk of explosion.

Preventing risks of fatal injury from electric shocks

- Make sure that all regulations applicable at the point of use are complied with.
- Always make sure that the controller is disconnected from the power supply before carrying out any work on it.
- Make sure that the connections of the protective extra-low voltage areas do not get mixed up with the power supply connections.
- On completion of installation work, refit the terminal cover and tighten the locking screw using a screwdriver.
- Make sure that the electrical connection of the controller can be disconnected from the mains externally if required.
- Make sure that all cables are secured by strain relief devices.
- Use the device only if it is in a fault-free condition.

Preventing risks of fire

- Install the controller on a non-flammable subsurface.

Preventing risks of injury from burns

- Carry out installation work on the solar power system only when it has cooled down.
- The process water can reach very high temperatures. Exercise particular care when configuring settings on the controller.
- Take water samples after completion of the settings and check them using a suitable thermometer.

Preventing damage to property

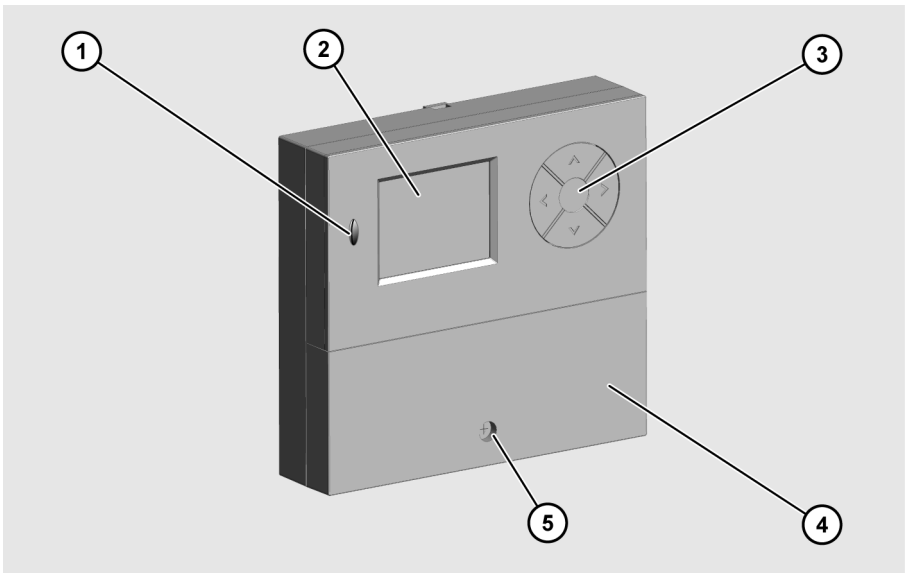
- A damaged controller may cause malfunctions in the system as well as damage to its components. Use the controller only if it is in a fault-free condition.
- Install the controller with due observance of its protection class. Information about this can be found in the chapter *Technical Data* from page 57 onwards.
- Make sure that no moisture gets into the controller.
- If any moisture gets into the controller, disconnect the controller from the power supply.
- Make sure that the maximum permissible ambient temperature is not exceeded. Information about this can be found in the chapter *Technical Data* from page 57 onwards.
- Make sure that all components to be connected to the switching outputs are suitable for an operating voltage of 230 V/50 Hz.

- When in "manual mode", the system must only ever be operated for a short time and only for test purposes.
- Install sensor lines separately from 230 V lines.
- Use only sensor connection boxes supplied by the manufacturer.

2 Description of the controller

The controller is used for monitoring and controlling a solar thermal system. The controller allows the system to be configured in accordance with the local situation at the place of use and with the requirements of the user. In addition, the controller can be used to carry out system protection functions.

2.1 Overview



- ① microSD card interface
- ② Display
- ③ Operating buttons
- ④ Terminal cover
- ⑤ Locking screw

The display (2) shows the menus for monitoring and controlling the solar power system. The operating buttons (3) allow you to display and change the parameters.

For data exchange purposes the controller is equipped with a microSD card interface (1).

3 Installing the controller



DANGER

Risk of fatal injuries due to explosions or fire.

- Never use the controller in areas where there is a risk of explosion.
 - Install the controller on a non-flammable subsurface.
-



DANGER

Risk of fatal electric shock when working on the opened controller.

- Make sure that the controller is disconnected from the mains voltage before removing the terminal cover.
 - Make sure that the power supply has been secured to prevent it from being switched on again.
 - Check that the controller is free from voltage.
 - Screw the terminal cover securely back in place when work has been completed.
-

ATTENTION

Risk of damage and malfunctions due to improper storage before connection.

- Store the controller at room temperature for at least four hours before connecting it.
-

Select an installation location which meets the following requirements:

- The installation location must be at eye level.
- The installation location must be close to the storage tank and the solar circuit pump.
- It must have access to the power supply.
- There must be sufficient space in front of the controller to allow it to be operated.
- If you wish to lead cables and lines through the back of the controller, there must be sufficient space for the cable gland.

3.1 Fastening the controller



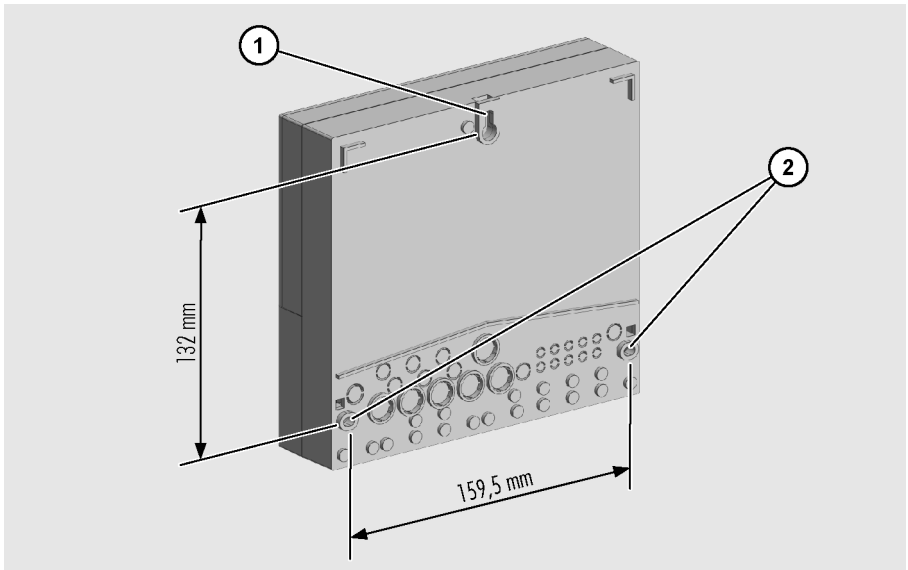
If you wish to lead cables and lines through the back of the controller, you need to do this before you fasten it.

ATTENTION

Risk of damage to the controller housing due to screws tightened too firmly.

➤ Tighten the screws only as firmly as necessary.

- Use only suitable screws and dowels for fastening the controller.
- Hang the controller on the top screw by the keyhole (1).
- Fasten the controller with the screws from the inside through the bottom screw holes (2).



4 Connecting the controller



DANGER

Risk of fatal electric shock when working on the opened controller.

- Make sure that the controller is disconnected from the mains voltage before removing the terminal cover.
 - Make sure that the power supply has been secured to prevent it from being switched on again.
 - Check that the controller is free from voltage.
 - Screw the terminal cover securely back in place when work has been completed.
-



DANGER

Risk of fatal electric shock due to ripped out cables.

- Make sure that all cables are adequately secured in position by screw clamps.
 - Make sure that there is no pull on the cables.
-

ATTENTION

Risk of damage to the controller and the solar power system due to the connection of unsuitable system components.

- Make sure that the operating voltage of the system components matches that of the controller. Information about this can be found in the chapter *Technical Data* from page 57 onwards.
-

ATTENTION

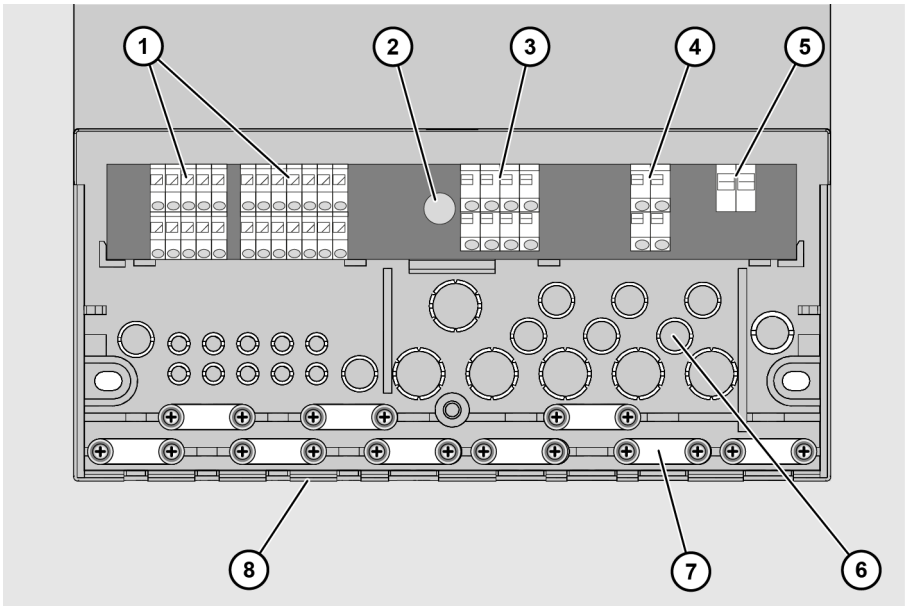
Risk of damage and malfunctions due to improper storage before connection.

- Store the controller at room temperature for at least four hours before connecting it.
-

4.1 Connecting cables to the controller

- Make sure that the cables and the controller are disconnected from the voltage.
- Remove the terminal cover.

The following illustration shows the elements of the controller that are important for connection:



Pos.	Description
1	Terminals for extra-low voltage area
2	Fuse
3	Terminals for 230 V area
4	Terminals for protective conductor
5	Terminals for relay contact
6	Cut-out apertures for cable feedthrough at the back
7	Screw clamps for securing the cables
8	Cut-out apertures for cable feedthrough on the underside

- Connect the cables to the corresponding terminals.

Information about connecting the system components to the corresponding terminals can be found in the section *Assignment of the terminals to the system components* from page 15 onwards.

- Screw the terminal cover securely back in place.

4.2 Connecting the controller to the power supply

When making the mains connection, you must ensure that the mains supply can be disconnected at any time. If you make a permanent mains connection, proceed as follows:

- Install a switch on the supply lead of the controller.

If you make the mains connection complete with cable and earthing pin plug, proceed as follows:

- Make sure that the earthing pin plug is easily accessible.
- Plug the earthing pin plug in the plug socket.

4.3 Connecting temperature sensors

ATTENTION

Risk of damage and malfunctions on the controller due to improper connection of the temperature sensors.

- Use only sensor connection boxes supplied by the manufacturer.
- Use only shielded cables for line extensions.
- Connect the shield of the extension cable to a PE terminal.
- Install sensor lines separately from 230 V lines.

Use cables with the following cross-sections for line extensions:

- Up to 15 m: $2 \times 0.5 \text{ mm}^2$
- 15 to 50 m: $2 \times 0.75 \text{ mm}^2$



When connecting the temperature sensors, you do not need to observe polarity for the two wires.

4.4 Assignment of the terminals to the system components

For orientation when assigning the terminals to the switching outputs, various different hydraulic layouts are shown in the following. These show simplified solar circuits that you can use with the controller. The process water circuit is not shown here. For the hydraulic layouts you can select "External heat exchanger" or "Three-way valve for bypass function" as extensions.

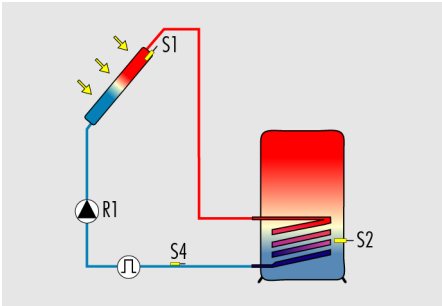
You can set the hydraulic layout at:

- Basic settings/Solar circuit/Hydraulic layout

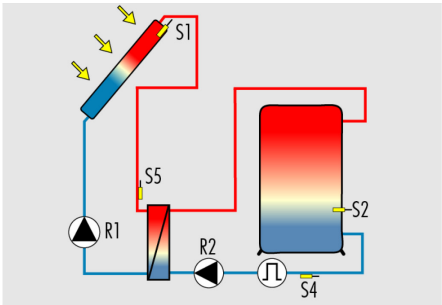
The connections in the following table are options that may be used in all hydraulic layouts:

Terminal	Use
S1 to S6	Connections for PT1000 temperature sensor
S0 + M	Radiation sensor input (white core of the radiation sensor at S0, red core at M)
S4 + S4	Temperature sensor for the collector return for the "Energy output measurement" function
S15 + 5V	Flow sensor for the "Energy output measurement" function
S14 + S15 5V + M	VFS (Vortex Flow Sensor) for the "Flow Monitoring" function "Flow" on S14, "Temperature" on S15. Further details can be found in the VFS manufacturer's documentation.
A + B	RS-485 interface (ProBus and ProBusX) Make sure that the polarity of the bus connection is not mixed up (A-A, B-B). Use paired twisted-conductor cables for connection.
HE 1+ M 1	Power control for high-efficiency pump (HE pump) 1 230 V power supply for the pump via switching output R1
HE 2+ M 2	Power control for high-efficiency pump (HE pump) 2 230 V power supply for the pump via switching output R2

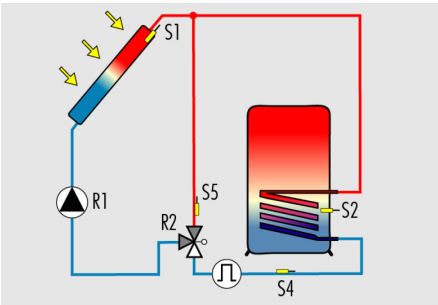
Terminal assignment for hydraulic layout 110.00



Hydraulic layout 110.00



Hydraulic layout 111.00

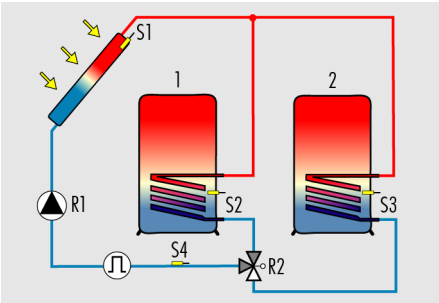


Hydraulic layout 112.00

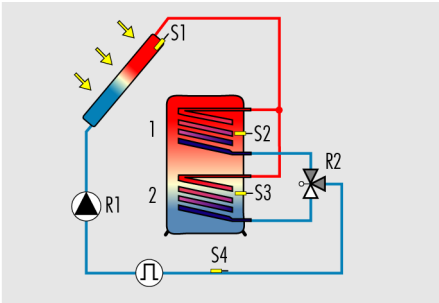
S14	SV	A	HE1	HE2	S0	S1	S2	S3	S4	S5	S6	L	R1	R2	R3	PE	PE	RO	RO
S15	M	B	M1	M1	M	S1	S2	S3	S4	S5	S6	×	×	(×)	N	×	(×)	×	×
					×	×				(×)		N	N	N	N	×	×		
												×	×	(×)					

Terminal	Use
R1 + N + PE	Solar circuit pump
(R2 + N + PE)	111.00: Secondary pump 112.00: Three-way valve for bypass function
S1 + S1	Temperature sensor for collector
S2 + S2	Temperature sensor for storage tank
(S5 + S5)	Temperature sensor for collector feed

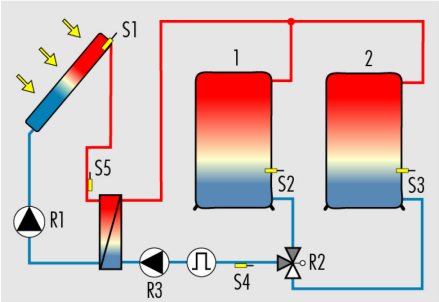
Terminal assignment for hydraulic layout 210.01



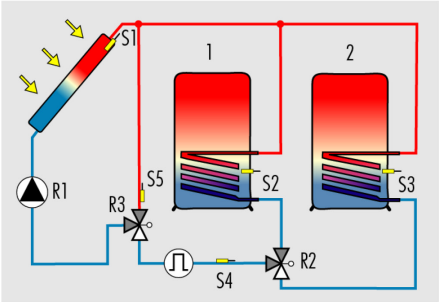
Hydraulic layout 210.01



Alternative layout



Hydraulic layout 211.01

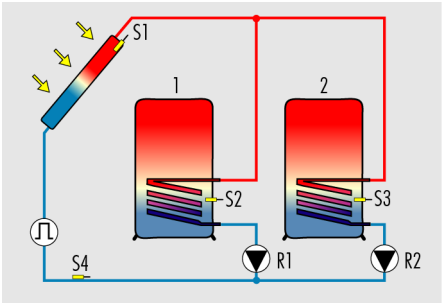


Hydraulic layout 212.01

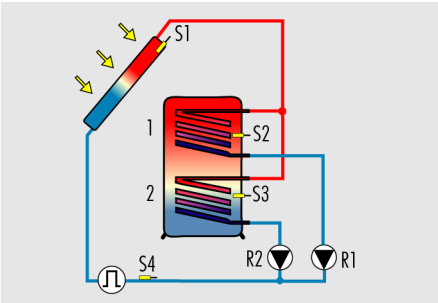
S14	5V	A	HE1	HE2	S0	S1	S2	S3	S4	S5	S6	L	R1	R2	R3	PE	PE	RO	RO
						×	×	×		(×)		×	×	×	(×)	×	×		
S15	M	B	M1	M1	M	S1	S2	S3	S4	S5	S6	N	N	N	N	PE	PE		
						×	×	×		(×)		×	×	×	(×)	×	×		

Terminal	Use
R1 + N + PE	Solar circuit pump
R2 + N + PE	Three-way valve
(R3 + N + PE)	211.01: Secondary pump 212.01: Three-way valve for bypass function
S1 + S1	Temperature sensor for collector
S2 + S2	Temperature sensor for storage tank 1
S3 + S3	Temperature sensor for storage tank 2
(S5 + S5)	Temperature sensor for collector feed

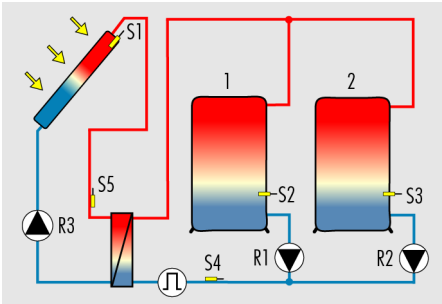
Terminal assignment for hydraulic layout 210.02



Hydraulic layout 210.02



Alternative layout



Hydraulic layout 211.02

S14	SV	A	HE1	HE2
S15	M	B	M1	M1

S0	S1	S2	S3	S4	S5	S6
	×	×	×		(×)	
M	S1	S2	S3	S4	S5	S6
	×	×	×		(×)	

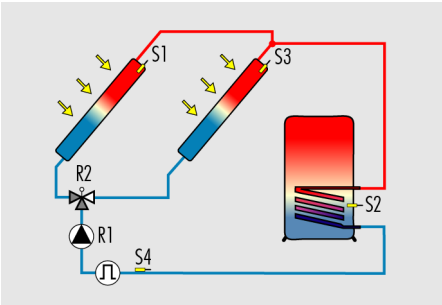
L	R1	R2	R3
×	×	×	(×)
N	N	N	N
×	×	×	(×)

PE	PE
×	×
PE	PE
×	(×)

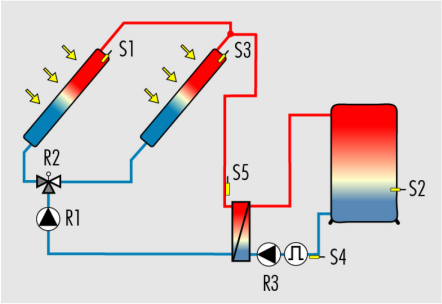
RO	RO
----	----

Terminal	Use
R1 + N + PE	Pump for storage tank 1
R2 + N + PE	Pump for storage tank 2
(R3 + N + PE)	211.02: Solar circuit pump
S1 + S1	Temperature sensor for collector
S2 + S2	Temperature sensor for storage tank 1
S3 + S3	Temperature sensor for storage tank 2
(S5 + S5)	Temperature sensor for collector feed

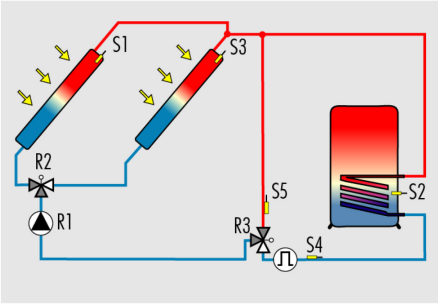
Terminal assignment for hydraulic layout 120.01



Hydraulic layout 120.01



Hydraulic layout 121.01

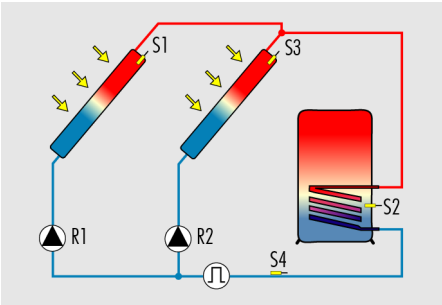


Hydraulic layout 122.01

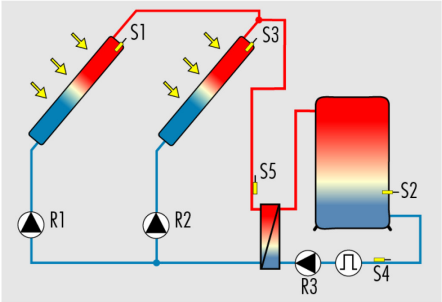
S14	5V	A	HE1	HE2	S0	S1	S2	S3	S4	S5	S6	L	R1	R2	R3	PE	PE	RO	RO
S15	M	B	M1	M1		×	×	×		(×)		×	×	×	(×)	×	×		
					M	S1	S2	S3	S4	S5	S6	N	N	N	N	PE	PE		
						×	×	×		(×)		×	×	×	(×)	×	(×)		

Terminal	Use
R1 + N + PE	Solar circuit pump
R2 + N + PE	Three-way valve
(R3 + N + PE)	121.01: Secondary pump 122.01: Three-way valve for bypass function
S1 + S1	Temperature sensor for collector 1
S2 + S2	Temperature sensor for storage tank
S3 + S3	Temperature sensor for collector 2
(S5 + S5)	Temperature sensor for collector feed

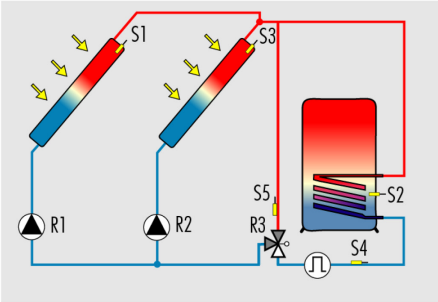
Terminal assignment for hydraulic layout 120.02



Hydraulic layout 120.02



Hydraulic layout 121.02



Hydraulic layout 122.02

S14	SV	A	HE1	HE2
S15	M	B	M1	M1

S0	S1	S2	S3	S4	S5	S6
	×	×	×		(×)	
M	S1	S2	S3	S4	S5	S6
	×	×	×		(×)	

L	R1	R2	R3
×	×	×	(×)
N	N	N	N
×	×	×	(×)

PE	PE
×	×
PE	PE
×	(×)

RO	RO
----	----

Terminal	Use
R1 + N + PE	Pump for collector 1
R2 + N + PE	Pump for collector 2
(R3 + N + PE)	121.02: Secondary pump 122.02: Three-way valve for bypass function
S1 + S1	Temperature sensor for collector 1
S2 + S2	Temperature sensor for storage tank
S3 + S3	Temperature sensor for collector 2
(S5 + S5)	Temperature sensor for collector feed

Terminal assignment for hydraulic layout 000.00

In layout 000.00 you can use all outputs as multi-function controllers. In this case you must define at least one of the four switching outputs R0, R1, R2 or R3 as a multi-function controller.





Terminal	Use
R1 + N + PE	Multi-function controller on switching output R1
R2 + N + PE	Multi-function controller on switching output R2
R3 + N + PE	Multi-function controller on switching output R3
R0 + R0	Multi-function controller on switching output R0 (potential-free normally open contact)
S1 + S1	Option: "Cooling", "Heating" or "Temperature difference controller" functions
S2 + S2	Option: "Cooling", "Heating" or "Temperature difference controller" functions
S3 + S3	Option: "Cooling", "Heating" or "Temperature difference controller" functions
S4 + S4	Option: "Cooling", "Heating" or "Temperature difference controller" functions
S5 + S5	Option: "Cooling", "Heating" or "Temperature difference controller" functions
S6 + S6	Option: Temperature display

5 Operating the controller

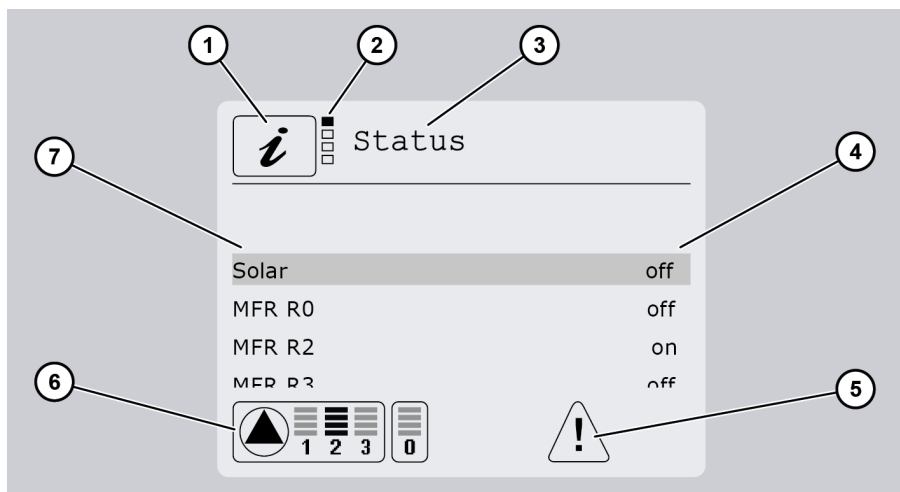
This chapter provides you with an overview of the controller's display elements and operating elements. This is followed by explanations of all the basic actions.

5.1 Description of the display elements

The following menu symbols are displayed in the top part of the display in the main menu:

Main menu	
Symbol	Description
	"Info" menu This is for displaying measurement and output values and status messages.
	"Program" menu This is for displaying and changing parameters.
	"Manual mode" menu This is for switching outputs on and off for test purposes. Only specialist personnel are permitted to make changes to the values in this menu.
	"Basic settings" menu This is for displaying and changing basic settings. Only specialist personnel are permitted to make changes to the values in this menu.

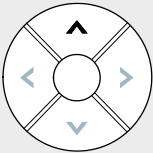
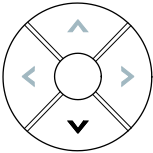
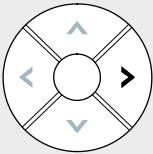
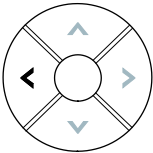
The menu symbol (1), menu level (2) and the name of the active menu level (3) are displayed in the top part of the display. The middle part of the display shows menu items in list form. The names of the menu items (7) are displayed on the left-hand side. On the right-hand side you will see the current values or status messages (4) for each of the menu items. The selected line will have a gray background. The bottom part of the display shows basic system functions and messages from the controller. The following illustration shows a display screen by way of illustration:



Pos.	Description
1	Active menu (In this case: "Info" menu)
2	Display for the menu level (In this case: Level 1)
3	Name of the active menu level
4	Current value or status
5	Fault symbol: This symbol is displayed flashing in the event of a fault.
6	Pump symbol and switching outputs: The pump symbol rotates whenever the pump is switched on. There is a bar display above each switching output showing the current control power
7	Menu items

5.2 Using the operating buttons

The operating buttons allow you to navigate in the menus and make changes to values. The following table explains the functions of the operating buttons:

Operating buttons	Function
	Move up in the list. Increase the displayed value.
	Move down in the list. Call up the selected menu. Reduce the displayed value.
	Move to the right in the main menu. Select or activate a menu item. Confirm a change to a value.
	Move to the left in the main menu. Cancel the activation of a menu item. Any value changes that have not been confirmed will be discarded. The value that is currently set will be displayed. Return to the main menu. In the case of fault messages: Switch off the warning signal.

Navigating in the menus

- To switch to the main menu, press ◀ as often as required until the main menu is displayed.
- Use ◀ or ▶ to select the required menu.

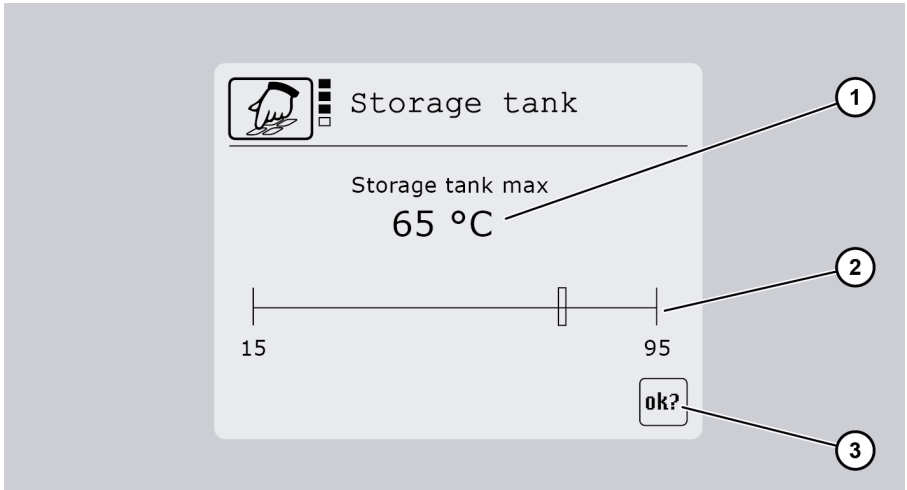
The selected menu symbol flashes.

- To display the various different menu items, select ▼ or ▲.
- To display a menu item, select ▶.
- To exit a menu item, select ◀.

Changing values

- To activate a menu item, select ➤.

The "Change value" display screen will be displayed. The value will be displayed as a figure (1) and as a bar display (2). The bar display shows the setting range (In this case: 15–95 °C).



- To increase the value, select ▲.
- To reduce the value, select ▼.
- To abort the change to a value, select ◀.
- To confirm the entry, select ➤.

The value stops flashing. The OK symbol (3) will be displayed and will flash.

- To cancel the entry, select ◀.
- To re-confirm the entry, select ➤.


The value will be saved and the overview will be displayed.



If you press the ▲ or ▼ buttons once, the value will be increased or reduced in steps. If you keep these buttons pressed, the value will be increased or reduced on a continuous basis.

6 Displaying and changing the values in the menus

This chapter provides an overview of the menus and menu items. Menu items for the first menu level are displayed in **bold** . Menu items for the second menu level are displayed beneath in standard text.

 Depending on which additional functions have been activated, not all values will necessarily be displayed.

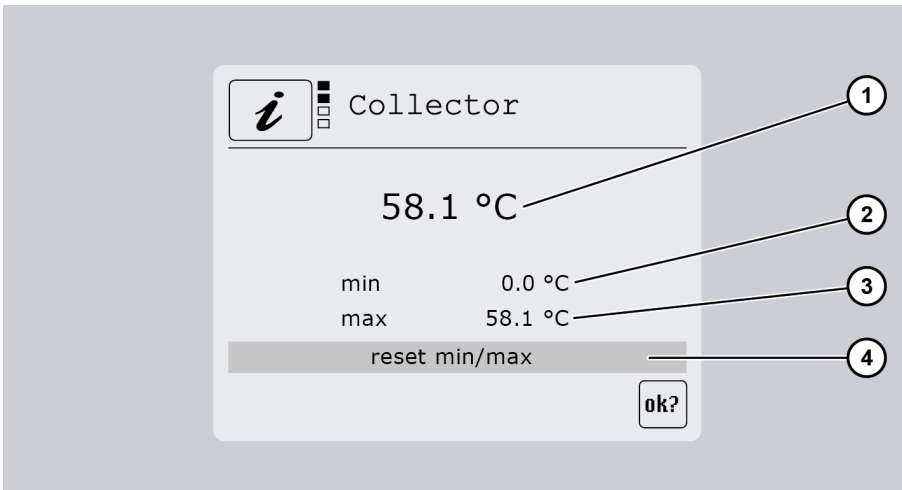
6.1 Displaying values in the "Info" menu



The "Info" menu allows you to display measurement and output values and status messages.

Solar circuit

This menu allows you to display measurement values in the solar circuit and to reset them to the current measurement value. In this case the terminal designation precedes the designation for the sensor (e. g. S01: Collector). Whenever you activate a menu item, the "Measurement value" display screen will be displayed.



Pos.	Description
1	Current measured value
2	Display of the minimum value reached so far
3	Display of the maximum value reached so far
4	Reset the minimum and maximum values to the current measurement value

To reset a value, proceed as follows:

➤ Select ➤ .

The OK symbol will be displayed.

➤ Press ➤ to confirm.

The value will be reset.

MFC R0–R3

This menu allows you to display and reset measurement values of the multi-function controller. In this case the terminal designation precedes the designation for the sensor (e.g. S1: Source). As in the "Solar circuit" menu item, you can also reset the minimum and maximum values here.

Status


This menu allows you to display the following status messages:

Menu item	Description
Solar	The following status messages can be displayed: <ul style="list-style-type: none"> – Off – Charging priority 1/2 – Collector protection – System protection – Recooling – Anti-freeze protection – Waiting time – Tube collector – Drain-back – Parallel charging – Fault
Circulation	Only if a circulation fault occurs.
MFC 0–3	The following status messages can be displayed: <ul style="list-style-type: none"> – On – Off

Balance values

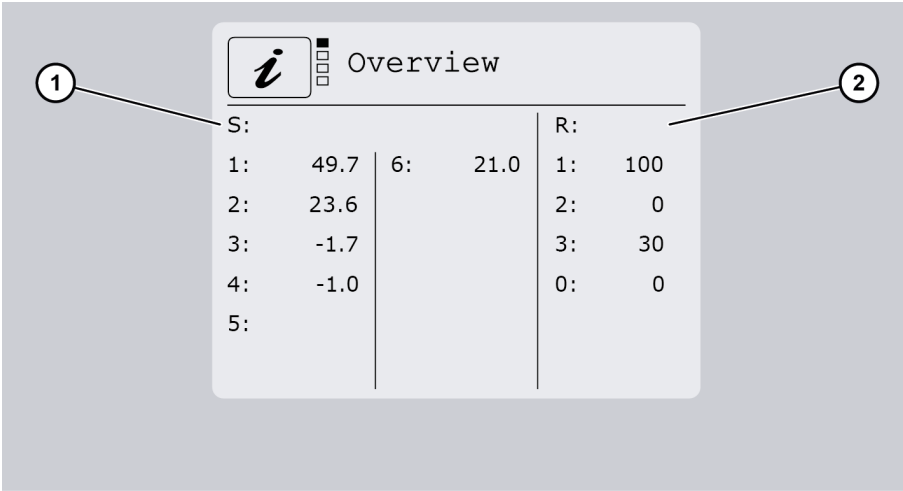
This menu allows you to display the following balance values and, if necessary, reset them:

- Operating hours (resetting is possible)
- Output (resetting is possible)
- Flow

 For systems with two storage tanks, the tanks are denoted by the digits "1" and "2" respectively.

Overview

This menu allows you to display an overview of all outputs (2) and inputs (1). It allows a value to be displayed. Nothing will be displayed if a sensor is not connected.



6.2 Displaying and changing values in the "Program" menu



The "Program" menu allows you to display and change the parameters. The "Current settings" column allows you to enter your settings.



WARNING

Risk of scalding from hot water as a result of incorrect settings.

- Exercise particular care when configuring settings on the controller.
- Take water samples after completion of the settings and check them using a suitable thermometer.

ATTENTION

Risk of system malfunctions due to incorrect settings.

- Set parameters only if you know their effects.
-

Solar circuit

Menu item	Description	Range	Factory settings	Current setting
Storage tank 1/2				
Storage tank max	Required maximum temperature	15–95 °C	65 °C	
dTon	Switch-on difference	3–40 K	7 K	
dToff	Switch-off difference	2–35 K	3 K	
Storage tank active	"Storage tank priority" function: Specify the storage tank priority Activate or deactivate the storage tank with priority 2	Prio1/Prio2 Prio2/Prio1/Off	Prio1 Prio2	
Parallel charging	Temperature difference for the "Parallel charging" function	10–50 K	30 K	-
Speed control	Minimum pump output with speed control 100% = Speed control off	30–100 %	100 %	-

Menu item	Description	Range	Factory settings	Current setting
Target temperature	Required temperature for the "Target temperature" charging principle	15–85 °C	40 °C	
Radiation	Value at which the "Tube collector" or "Drain-back" (radiation-controlled) functions start.	0–500 W	100 W	
Tube start time	Time at which the "Tube collector" or "Drain-back" (time-controlled) functions start	00:00–24:00	6:00	
Tube stop time	Time at which the "Tube collector" or "Drain-back" (time-controlled) functions stop	00:00–24:00	20:00	

MFC R0–R3

Menu item	Description	Range	Factory settings	Current setting
Setpoint temperature	Switch-on temperature	20–90 °C	40 °C	
Hysteresis	Temperature range	1–30 K	10 K	
Tmax sink	Maximum temperature of the sink for the "Temperature difference controller" function	0–95 °C	65 °C	
Diff. controller max	Switch-on difference for the "Temperature difference controller" function	3–40 K	7 K	
Tmin source	Minimum temperature of the source for the "Temperature difference controller" function	0–95 °C	15 °C	
Diff. controller min	Switch-off difference for the "Temperature difference controller" function	2–35 K	3 K	
Time 1–3: Start	Start time for time windows 1–3: When the start time for time window 1 has been specified, you can specify the start times for time windows 2 and 3.	00:00–24:00	00:00	

Menu item	Description	Range	Factory settings	Current setting
Time 1–3: Start	Start time for time windows 1-3: When the start time for time window 1 has been specified, you can specify the start times for time windows 2 and 3.	00:00–24:00	00:00	

System

Menu item	Description	Range	Factory settings	Current setting
SD card on/off	Deactivate microSD card. This menu item will be displayed only if a microSD card has been inserted. When it is inserted, the microSD card is automatically activated. An SD card symbol in the "Info" menu indicates that data logging is in progress.	On Off	Off	
Logging interval	Logging interval for data logging in seconds. This menu item will be displayed only if a microSD card has been inserted.	1 s 60 s	60 s	
Warning signal	Switch the acoustic warning signal on or off when there are faults	On Off	Off	
Time	Current time	00:00–23:59	12:00	
Date	Current date	09.06.14		
Firmware	Display of the current firmware version	V.1–V.x	V.1	
Controller ID	ID number of the controller. Change only if several controllers of identical type are used in the same bus system. The change of controller ID will not take effect until after the controller is restarted.	4160–4169	4160	

6.3 Controlling switching outputs in the "Manual mode" menu



The "Manual mode" menu allows the controller's switching outputs to be turned on and off for test purposes. To enable the controller to run in automatic mode again, you have to exit manual mode after completion of setting tasks.

ATTENTION

Risk of system malfunctions due to incorrect settings.

- Make sure that only specialist personnel ever make any changes to the values in this menu.

Menu item	Description	Range	Factory settings
Output R0–R3	Switch switching output R0–R3 on or off manually. Depending on the hydraulic layout which has been set, only the switching outputs in use will be displayed.	Off On	Off
Post-running time	After you exit the menu the controller switches to automatic mode after the post-running time.	0–30 min	30 min

6.4 Displaying and changing values in the "Basic settings" menu



The "Basic settings" menu allows you to display and change basic settings. The "Current settings" column allows you to enter your settings.

ATTENTION

Risk of system malfunctions due to incorrect settings.

- Make sure that users use only user mode.
 - Make sure that the values are only ever changed by specialist personnel.
-

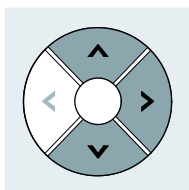
There are two operating modes:

- User mode
- Editing mode

In user mode you can display values in this menu, but you cannot make any changes to them. If user mode is activated, the menu symbol is displayed in the form of a "locked" symbol.

In editing mode you can display and make changes to values in this menu. If editing mode is activated, the menu symbol is displayed in the form of an "unlocked" symbol. Only specialist personnel are permitted to activate editing mode.

➤ To activate editing mode, press the **▲**, **➤** and **▼** buttons simultaneously.



The menu symbol will be displayed in the form of an "unlocked" symbol. Editing mode will be active.

Solar circuit

Menu item	Description	Range	Factory settings	Current setting
Hydraulic layout	Set the system type. Layout: abc.x a: Number of storage tanks b: Number of collectors c: Extensions (0=None, 1=Heat exchanger, 2=Bypass) x: Version	000.00 a: 1–2 b: 1–2 c: 0–2 x: 00–02	110.00	
Charging break	"Storage tank priority" function: Pause between charging the storage tank Multi-tank systems only	30–480 s	240 s	
Priority	"Storage tank priority" function: Order in which storage tank 1 and storage tank 2 are charged. Multi-tank systems only. Layout: ab a: Storage tank 1 b: Storage tank 2	12 21	12	

Menu item	Description	Range	Factory settings	Current setting
Parallel charging	Switch the "Parallel charging" function on or off	Off On	Off	
Charging principle		DeltaT (temperature-difference) Target temperature	DeltaT	
Collector protection				
Function	Switch the "Collector protection" function on or off	Off On	Off	
Temperature	Temperature at which the "Collector protection" function becomes active	110–150 °C	120 °C	
Drain-back				
Function	Switch on the "Drain-back" function in the required control type (time-controlled/radiation-controlled). Switch off the "Drain-back" function.	Off Time Radiation	Off	
Fill time	Fill time of the "Drain-back" function	15–360 s	180 s	
Recooling				
Function	Switch the "Recooling" function on or off	Off On	Off	
Recooling temp	Temperature to which the storage tank is recooled after an active "Collector protection" function	30–90 °C	40 °C	
Tube collector				
Function	Switch on the "Tube collector" function in the required control type (time-controlled/control via temperature change/radiation-controlled). Switch off the "Tube collector" function.	Off Time dT/dt Radiation	Off	
Pump runtime	Pump runtime of the "Tube collector" function	10–120 s	30 s	
Time	Interval period for control via temperaturechange	1–60 s	30 s	

Menu item	Description	Range	Factory settings	Current setting
delta T	Temperature for control via temperaturechange	1.0 °C–5.0 °C	1.0 °C	
Anti-freeze protection				
Function	Switch the "Anti-freeze protection" function on or off	Off On	Off	
Sensor	Select the sensor input	S1–S6	S6	
Temperature	Temperature at which the "Anti-freeze protection" function becomes active	-20–+7 °C	3 °C	
System protection				
Temperature	Temperature at which the "System protection" function becomes active	110–150 °C	130 °C	
Pump type R1 (R2)	Select the pump type on switching output R1 (R2)	230 V block Analog PWM Inverted PWM	230 V block	

Output measurement

Menu item	Description	Range	Factory settings	Current setting
Measurement principle	Switch on output measurement with the required measurement principle. Switch off output measurement.	Off DFG VFS DFA	Off	
Litres per pulse	Pulse value for the "DFG" measurement principle	0.5–25 litres per pulse	1.0 litre per pulse	
VFS type	Select the type for the "VFS" measurement principle. Type 20=1–20 litres Type 40=2–40 litres	1–20 2–40	1–20	
DFA	Flow rate for the "DFA" measurement principle. Unit: Litres per minute	0.1–75 litres/min	10.0 litres/min	

Menu item	Description	Range	Factory settings	Current setting
Glycol type	Select the glycol type for the coolant.	Anro, Ilexan EG/E/P, Antifrogen L/N, Tyfucor L5.5/LS, Dowcal 10/20/N	Anro	
Glycol concentration	Mixing ratio for the coolant	0–100 %	50 %	

MFC R0–R3

Menu item	Description	Range	Factory settings	Current setting
Function	Switch on the MFC with the required function. Switch off the MFC.	Off Cooling Heating Difference controller Threshold value Return flow-boost Wood-fired boiler Circulation temp Circulation time Alarm Timer	Off	
Sensor source	Select the sensor input for the source	S1–S6	S5	
Sensor sink	Select the sensor input for the sink	S1–S6	S6	
Speed	"Wood-fired boiler" function: Minimum pump output with speed control. 100% = Speed control off	30–100 %	100 %	
Runtime	Duration of runtime for the "Time-controlled circulation" function	1–60 min	3 min	

Menu item	Description	Range	Factory settings	Current settings
Waiting time	Duration of waiting time for the "Time-controlled circulation" function	1–60 min	15 min	
Link	Logical link from the output to the other outputs Layout: R1, R2, R3, R0 Example of AND link: 10x1 1: Only if output is on 0: Only if output is off x: No link	R1: 0, 1, x R2: 0, 1, x R3: 0, 1, x R0: 0, 1, x	xxxx	

System

Menu item	Description	Range	Factory settings	Current settings
Load language	Change the language or load it from microSD card			
Parameters	Backup parameters from controller to microSD card. Load parameters from microSD card to the controller. This menu item will be displayed only if a microSD card has been inserted.	Off Backup Load	Off	
Factory settings	Load factory settings	Off Load	Off	
Firmware update	Carry out a firmware update. This menu item will be displayed only if a microSD card has been inserted. Only the firmware files will be displayed.	Off Start	Off	
Bus type	Selection from - ProBusX, for working with conexio 200 and FlexBox - ProBus, for working with conexio 600 The change will not take effect until after the controller is restarted.			

7 Setting the control functions

The general control functions allow you to configure the settings for the charging of the storage tanks. You can set the following control functions:

- Charging principle
- "Storage tank priority" function
- "Parallel charging" function
- Pump control
- "Tube collector" function

7.1 Setting the charging principle

In order to optimise the energy output, you can choose from the following charging principles:

- "Temperature difference" charging principle
- "Target temperature" charging principle

The charging principle is selected in the following menu item:

- Basic settings/Solar circuit/Charging principle

"Temperature difference" charging principle

In the case of the "Temperature difference" charging principle, the solar circuit pump is controlled in such a way that the temperature difference between the collector and the storage tank is maintained at as constant a level as possible.

"Target temperature" charging principle

In the case of the "Target temperature" charging principle, the solar circuit pump is switched on when a certain specific target temperature has been reached in the collector.

For this function you can set the following parameters:

- Program/Solar circuit/Target temperature

7.2 Setting the "Storage tank priority" function



This function is only available for dual tank systems.

The "Storage tank priority" function controls the tank charging of dual tank systems. There are the following types of dual tank systems:

- Systems with two separate storage tanks
- Systems with a stratified storage tank (a storage tank with two heat exchangers, one on top of the other)
- Systems with a storage tank in combination with a swimming pool
- etc.

In control mode, the first storage tank is charged as a storage tank with priority 1. If more heat is generated than required, the excess energy is fed into the second storage tank (storage tank with priority 2). In the case of the stratified storage tank, the top heat exchanger is defined as the first storage tank.

For this function you can set the following parameters:

- Basic settings/Solar circuit/Hydraulic layout
- Basic settings/Solar circuit/Charging break
- Basic settings/Solar circuit/Priority
- Program/Solar circuit/Storage tank active

7.3 Setting the "Parallel charging" function



This function is only available for dual tank systems.

If the preset temperature difference of the two storage tanks is exceeded and if the switch-on conditions for the low priority storage tank are met, both storage tanks will be charged simultaneously. Both pumps run with a pump output of 100 %. The energy output is divided between the two storage tanks.

For this function you can set the following parameters:

- Basic settings/Solar circuit/Hydraulic layout
- Basic settings/Solar circuit/Parallel charging
- Program/Solar circuit/Parallel charging

7.4 Setting the pump control system

You can connect standard pumps and high-efficiency pumps (HE pumps). For these you can set the following types of control system:

- 230 V block modulation (standard pumps)
- Analog control (HE pumps)
- Non-inverted PWM control (HE pumps)
- Inverted PWM control (HE pumps)

In order to keep the storage tank temperature as constant as possible, the solar circuit pumps can be controlled by means of speed control. You can set the minimum pump output with speed control between 30 % and 100 %. At 100 % the speed control will be switched off.

For this function you can set the following parameters:

- Basic settings/Solar circuit/Pump type R1 (R2)
- Program/Solar circuit/Speed control



For HE pumps the following applies:

Switching outputs R1 and R2 switch only the pump supply. They are not speed-controlled. Their minimum switch-on time is 5 seconds.

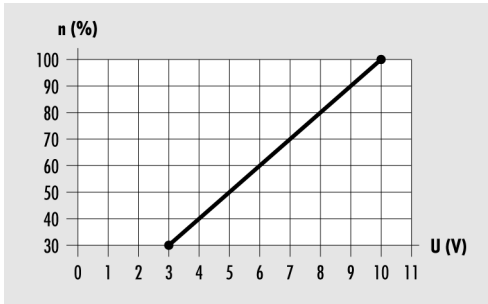
Controlling HE pumps with analog signals

In the case of the pump control system complete with analog signal, the controller sends a 0–10 V analog signal to terminals HE1 and HE2.

Definitions for the output voltage (U):

- Pump off: $0.5 \text{ V} < U < 1.0 \text{ V}$
- Speed control: Linear characteristic $3 \text{ V} < U < 10 \text{ V}$ (for a minimum pump output of 30 %)

The following diagram shows the power curve for the pump control system with analog signal.

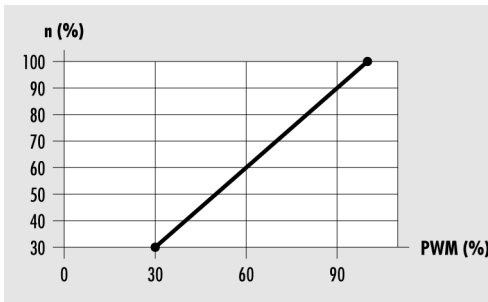


n (%) – Pump output
U (V) – Output voltage

Controlling HE pumps with PWM signals

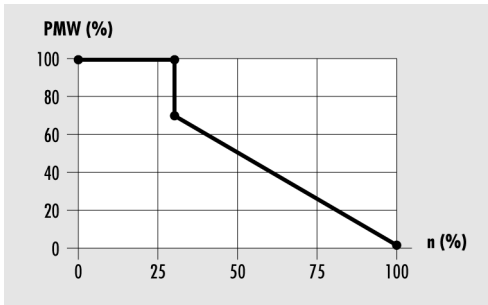
In the case of the pump control system with PWM signal, the controller sends a PWM signal (pulse width modulation signal) to terminals HE1 and HE2. The PWM signal can be sent normally (not inverted) or inverted.

In the case of the pump control system with a non-inverted PWM signal, the nominal speed of the pump (0–100 %) corresponds to the PWM signal (0–100 %). The following diagram shows the power curve for the pump control system with a non-inverted PWM signal.



n (%) – nominal speed of the pump
PWM (%) – non-inverted PWM signal

In the case of the pump control system with an inverted PWM signal, the nominal speed of the pump (0–100 %) corresponds to the PWM signal (100–0 %). The following diagram shows the power curve for the pump control system with an inverted PWM signal at a minimum pump output of 30 %.



PWM (%) – inverted PWM signal

n (%) – pump speed sent by the controller

7.5 Setting the "Tube collector" functions

If the solar power system is equipped with tube collectors, you have to activate this function.

The control type is selected in the following menu item:

- Basic settings/Solar circuit/Tube collector/Function
 - Time-controlled
 - Radiation-controlled
 - Control via temperature change

Time-controlled

You can set a time window and a pump runtime. In the time window the solar circuit pump is switched on at certain specific intervals for the duration of the preset pump runtime.

For this function you can set the following parameters:

- Basic settings/Solar circuit/Tube collector/Pump runtime
- Program/Solar circuit/Tube start time (stop)

Radiation-controlled

When the level of radiation reaches the preset radiation value, the solar circuit pump is switched on for the duration of the preset pump runtime.

For this function you can set the following parameters:

- Basic settings/Solar circuit/Tube collector/Pump runtime
- Program/Solar circuit/Radiation

Control via temperature change

Whenever the collector temperature rises by a predefined value within a predefined interval period, the solar circuit pump will be switched on.

For this function you can set the following parameters:

- Basic settings/Solar circuit/Tube collector/Time
- Basic settings/Solar circuit/Tube collector/delta T


7.6 Bypass function / external heat exchanger

When the criteria for switching on are met, the solar circuit pump is activated first in order to warm up the collector circuit. This optimizes the energy generation process, especially in larger solar power systems.

The storage tank is not charged until the temperature in the solar circuit is sufficient to do so. The parameters for switching on and off are permanently set in the controller.

8 Setting multi-function controllers (MFC)

Depending on the hydraulic layout, switching outputs R0–R7 and HE3 can be used as multi-function controllers (MFC). These can be set irrespective of the basic functions of the controller.

 The outputs are not HE-capable. R0 is not speed-controlled.

You can assign the following functions to the multi-function controllers:

- "Heating" function
- "Cooling" function
- "Temperature difference controller" function
- "Threshold value switch" function
- "Return flow boost" function
- "Wood-fired boiler" function
- "Circulation" function
- "Alarm" function
- "Timer" function

You can select the function for the required multi-function controller in:

- Basic settings/MFC R0 –R3/Function

8.1 Setting the "Cooling" function

In the case of the "Cooling" function, the switching output of the multi-function controller switches on as soon as the preset switch-on temperature is exceeded. If the temperature drops below the lower limit of the preset temperature range (hysteresis), the switching output of the multi-function controller switches off.

For this function you can set the following parameters:

- Basic settings/MFC R0–R3/Source sensor
- Program/MFC R0–R3/Setpoint temperature
- Program/MFC R0–R3/Hysteresis
- Program/MFC R0–R3/Time 1–3: Start (Stop)

8.2 Setting the "Heating" function

In the case of the "Heating" function, the switching output of the multi-function controller switches on as soon as the temperature falls below the preset switch-on temperature. If the temperature rises above the upper limit of the preset temperature range (hysteresis), the switching output of the multi-function controller switches off.

For this function you can set the following parameters:

- Basic settings/MFC R0–R3/Source sensor
- Program/MFC R0–R3/Setpoint temperature
- Program/MFC R0–R3/Hysteresis
- Program/MFC R0–R3/Time 1–3: Start (Stop)

8.3 Setting the "Temperature difference controller" function

In the case of the "Temperature difference controller" there is a measurement point at both the source and the sink. If the difference between the temperatures of the two measurement points exceeds a predefined value, the switching output of the multi-function controller switches on.

In addition, a minimum temperature can be set at the source and a maximum temperature at the sink. If the maximum temperature is exceeded or the temperature falls below the minimum temperature, the switching output of the multi-function controller switches off.

For this function you can set the following parameters:

- Basic settings/MFC R0–R3/Source sensor
- Basic settings/MFC R0–R3/Sink sensor
- Basic settings/MFC R0–R3/Speed

- Program/MFC R0–R3/Tmax sink
- Program/MFC R0–R3/Diff. controller max
- Program/MFC R0–R3/Tmin source
- Program/MFC R0–R3/Diff. controller min
- Program/MFC R0–R3/Time 1–3: Start (Stop)

8.4 Setting the "Threshold value switch" function

In the case of the "Threshold value switch" function, the switching output of the multi-function controller switches on as soon as the temperature reaches the preset switch-on temperature. If the temperature drops below or rises above the preset temperature range (hysteresis), the switching output of the multi-function controller switches off.

To use this function for heating, set the "Hysteresis" value to greater than 0. To use this function for cooling, set the "Hysteresis" value to less than 0.

For this function you can set the following parameters:

- Basic settings/MFC R0–R3/Source sensor
- Program/MFC R0–R3/Setpoint temperature
- Program/MFC R0–R3/Hyteresis

8.5 Setting the "Return flow boost" function

To save energy, energy is supplied to the heating return flow from the solar circuit or storage tank. The mode of operation and relevant parameters are similar to those of the "Temperature difference controller" function.

8.6 Setting the "Wood-fired boiler" function

This function allows you to re-heat the storage tank from a solid fuel boiler. The switching output of the multi-function controller will be activated if the boiler temperature (source sensor) plus the selected temperature range (hysteresis) exceeds the storage tank temperature (sink sensor).

In addition you can also define a switch-on temperature (setpoint temperature). In this case the pump will not start until the switch-on temperature has been reached.

With this function the storage tank will be heated to a maximum temperature of 95 °C.

For this function you can set the following parameters:

- Basic settings/MFC R0–R3/Source sensor
- Basic settings/MFC R0–R3/Sink sensor
- Basic settings/MFC R0–R3/Speed
- Program/MFC R0–R3/Tmin source
- Program/MFC R0–R3/Hyteresis

8.7 Setting the "Circulation" function

This function provides you with hot water at all times. You can choose from the following control types:

- Temperature-controlled
- Time-controlled

Temperature-controlled

The switching output of the multi-function controller switches on as soon as the temperature falls below the preset setpoint temperature. If the temperature rises above the upper limit of the preset temperature range (hysteresis), the switching output switches off.

For this control type you can set the following parameters:

- Basic settings/MFC R0–R3/Sensor source (fit the sensor in the circulation return flow)
- Program/MFC R0–R3/Setpoint temperature
- Program/MFC R0–R3/Hysteresis

Time-controlled

The circulation pump is switched on and off in alternation within a preset time window. You can configure the setting for the duration of the respective runtime and waiting time.

For this control type you can set the following parameters:

- Basic settings/MFC R0–R3/Runtime
- Basic settings/MFC R0–R3/Waiting time
- Program/MFC R0–R3/Time 1–3 start (stop)

8.8 Setting the "Alarm" function

In the case of this function, the switching output of the multi-function controller switches on or off when there is a fault on the sensors used. For this function you can set the following parameters:

- Basic settings/MFC R0 –R3/Link

8.9 Setting the "Timer" function

In the case of this function, the switching output of the multi-function controller switches on within the preset time window. For this function you can set the following parameters:

- Program/MFC R0–R3/Time 1–3 start (stop)

8.10 Setting the logical link

In principle, all MFC can be linked with other outputs. This means that the status of another output will influence the control operation of the respective MFC.

Example for MFC R3: The value 10XX is entered in the "Basic settings" – MFC - Link menu. Assignment:

R1	R2	R3	R0
1	0	x	x

This would mean that MFC R3 would only be active if:

- The corresponding switch-on conditions are met AND
- R1 is on (1) AND R2 is off (0). R0 does not need to be taken into account (x).



Its own output (in this case R3) cannot be edited.

9 Setting protective functions

In order to protect the solar power system against frost and overheating, the controller is equipped with the following protective functions:

- "Collector protection" function
- "Storage tank protection" function
- "System protection" function
- "Pump protection" function
- "Heat exchanger protection"
- "Recooling" function
- "Drain-back" function
- "Anti-freeze protection" function

9.1 Setting the "Collector protection" function


This function protects the collector against overheating. If the preset collector protection temperature is exceeded, the solar circuit pump switches on. The pump runs until the temperature limit in the storage tank (95 °C) has been reached. This is done irrespective of the preset maximum storage tank temperature.

If the temperature of the collector falls below the preset collector protection temperature by 10 °C, the solar circuit pump switches off. The system will run again in normal operating mode.

For this function you can set the following parameters:

- Basic settings/Solar circuit/Collector protection


9.2 "Storage tank protection" function

-  If a hydraulic layout with two storage tanks is used, the "Storage tank protection" function will be automatically active and cannot be changed.

This function protects the storage tanks against overheating caused by faulty wiring or any other possible faults. If the temperature limit is exceeded in one of the storage tanks (95 °C), all switching outputs will be switched off. The storage tank will no longer be charged.

When the temperature in the storage tank falls below the temperature limit again, the system will be in normal operating mode again.

9.3 "System protection" function

-  This function is active at all times.


This function protects the system against overheating. If the temperature of the collector rises above the preset system protection temperature, the solar circuit pump switches off.

When the temperature falls below the system protection temperature, the system will be in the "Collector protection" function again. When the temperature falls below the collector protection temperature, the system will be in normal operating mode.

For this function you can set the following parameters:


- Basic settings/Solar circuit/System protection

9.4 "Pump protection" function

-  This function is active at all times and cannot be changed.

If the solar circuit pump is not activated for 10 days, the controller starts the solar power system automatically for 30 seconds.

9.5 "Heat exchanger protection"

-  This function is automatically active if a hydraulic layout with external heat exchanger is activated.

This function protects the heat exchanger against damage from frost. Whenever the temperature on the collector falls below 5 °C, the heat exchanger pump switches on.

9.6 Setting the "Recooling" function

ATTENTION

Risk of damage to the solar power system if operated with the "Recooling" function in combination with reheating.

- Make sure that reheating is not in operation before you activate the "Recooling" function.



The "Recooling" function can be activated only if the "Collector protection" function is active.

This function protects the system against overheating in the following situations:

- If no hot water is used over an extended period of time (e. g. during a vacation)
- If the collector protection temperature is exceeded

If the temperature in the collector falls below the temperature in the storage tank (usually at night), the solar circuit pump switches on. This recools the storage tank to a preset temperature.

For this function you can set the following parameters:

- Basic settings/Solar circuit/Collector protection
- Basic settings/Solar circuit/Recooling

9.7 Setting the "Drain-back" function



The "Drain-back" function can be activated only if the "Recooling" function has been deactivated.

The "Drain-back" (return flow) function protects the solar power system against overheating and frost. This function requires the installation of a collection tank. When the solar circuit pump is switched off, heat transfer fluid flows back into the collection tank. In the process, the heat transfer fluid is cooled down or heated up.

When the solar circuit is switched back on, it will initially run for the duration of the preset pump runtime with full pump output. Afterwards the solar circuit pump will then run in normal operating mode again.

For this function you can set the following parameters:

- Basic settings/Solar circuit/Collector protection/Temperature
- Basic settings/Solar circuit/Drain-back

You can choose between the control types "Time-controlled" and "Radiation-controlled".

Time-controlled

You can set a time window and a pump runtime. In the time window the solar circuit pump is switched on at certain specific intervals for the duration of the preset pump runtime.

For this control type you can set the following parameters:

- Program/Solar circuit/Tube start time (stop)


Radiation-controlled

When the level of radiation reaches the preset radiation value, the solar circuit pump is switched on for the duration of the preset pump runtime.

For this control type you can set the following parameters:

- Program/Solar circuit/Radiation

9.8 Setting the "Anti-freeze protection" function

 The "Anti-freeze protection" function can be activated only if the "Drain-back" function has been deactivated.

This function protects the solar power system against the heat transfer fluid freezing. If the temperature falls below the preset temperature, the solar circuit pump switches on.

If the preset temperature is exceeded, the solar circuit pump switches off. The system will run again in normal operating mode.

For this function you can set the following parameters:

- Basic settings/Solar circuit/Anti-freeze protection

10 Measuring energy output

The controller can calculate and display the energy output of the solar power system. To do so, it requires the following values:

- Flow rate
- Temperature difference between the collector and collector return flow temperatures
- Glycol type and glycol concentration in the heat transfer fluid

The energy output is displayed in the following menu item:

- Info/Balance values/Output

For the energy output measurement you can set the following parameters:

- Basic settings/Output measurement

You can choose from the following measurement principles:

- DFG (Flow sensor)
- VFS (Vortex flow sensor)
- DFA (Flow indicator)

10.1 DFG (Flow sensor)

The flow sensor measures the flow rate mechanically. It is located on the return flow pipe of the solar power system. To determine the energy output with a flow sensor, the pipe-mounted sensor S4 must also be connected for temperature measurement.

10.2 VFS (Vortex flow sensor)

The VFS measures the flow rate and the temperature. The following types can be installed in the solar power system:

- VFS Type 1–20 (Measuring range of 1 to 20 litres/minute)
- VFS Type 2–40 (Measuring range of 2 to 40 litres/minute)

10.3 DFA (Flow indicator)

In the case of this measurement principle the flow rate is measured just the once by a flow indicator (flow indicator on the solar pump group – Tacosetter or adjustment valve) at a pump output of 100 % (e. g. in manual mode). The measurement value is entered at the controller. The flow indicator can then be removed again. The energy output is determined on the basis of this measurement value.



If you use the "Flow indicator" measurement principle, you must make sure that you do not operate the solar circuit pump with speed control. This would lead to incorrect results for the energy output measurement. Enter the value "100 %" in the "Program/Solar circuit/Speed control" menu item.

11 Restore factory settings

ATTENTION

Risk of loss of current settings due to incorrect restoration of the factory settings.

- Before restoring the factory settings, make sure that you no longer require the current settings.
 - If necessary, save the current settings to a microSD card before restoring the factory settings.
-

The factory settings are the parameters that were preset ex works.

- In order to restore the factory settings, select the value "Load" in the "Basic settings/System/Factory settings" menu item.

The factory settings will be restored.

12 Networking the controller with other devices

The RS-485 interface (ProBus and ProBusX) allows you to connect the controller to other devices in a network. By networking (with the conexio 600 or conexio 200 web module) you can use the following additional functions via a PC, tablet PC, smartphone etc.:

- Viewing the controller's data on another device (monitoring)
- Operating the controller from another device (remote control)
- Carrying out a firmware update

The manufacturer can provide further details.



These functions are available for device version V1.10 and higher.

13 Faults

ATTENTION

Risk of damage to the system if faults are remedied incorrectly.

- Make sure that faults are only ever remedied by specialist personnel.

There are two categories of system faults:

- Faults that are detected by the controller and trigger a fault message
- Faults that are not detected by the controller and do not trigger a fault message

13.1 Faults with fault message

In the event of faults with fault messages, the fault symbol will start flashing in the bottom part of the display. The backlighting will flash simultaneously. The acoustic warning signal will be sounded as well if it is active.

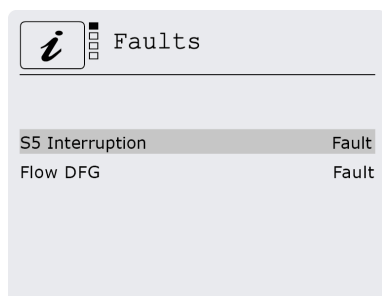
- To switch off the flashing of the backlighting and the acoustic warning signal, press the operating button. ◀.

The acoustic warning signal is activated and deactivated in the following menu item:

- Program/System/Warning signal

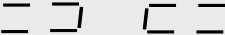

Displaying fault messages

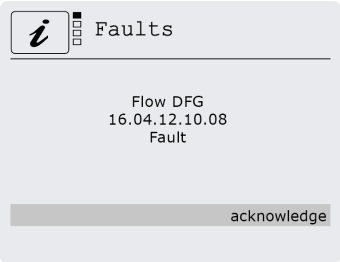
- To display the fault message, go to the "Info" - "Fault" menu.



All the faults which have occurred are displayed here. Clicking with the right-hand mouse button allows you to display the time and date. When the fault is no longer present, "Fault OK" will be displayed. You can delete the message with "Reset".

The table below shows the faults with fault messages:

Fault message	Possible cause	Action
Interruption Additional symbol indicator in "Info"/"Solar circuit" 	A sensor line is interrupted.	Make sure that the sensor line is intact.
	A sensor is faulty.	Check the sensor resistance. If necessary, replace the sensor.
Short circuit Additional symbol indicator in "Info"/"Solar circuit" 	A short circuit has occurred in the sensor line.	Make sure that the sensor line is intact.
	A sensor is faulty.	Check the sensor resistance. If necessary, replace the sensor.
Circulation fault Malfunctioning flow (temperature difference between the collector and storage tank is too high) This message will not lead to the pump being turned off. The message will be reset automatically when the fault is no longer present.	Faulty pump connection line.	Make sure that the pump wiring is intact.
	Faulty pump.	Replace the pump.
	Air in the system.	Vent the system.
	Faulty sensor line.	Make sure that the sensor line is intact.
	Faulty sensor.	Check the sensor resistance. If necessary, replace the sensor.

Fault message	Possible cause	Action
 <p>Energy output measurement: No flow is detected</p>	A sensor line is faulty.	Make sure that the sensor line is intact.
	Faulty pump connection line.	Make sure that the pump wiring is intact.
	A pump is faulty.	Replace the pump.
	There is air in the system.	Vent the system.

13.2 Faults without fault message

The table below shows the faults without fault messages:

Fault	Possible cause	Action
No indication on the display.	There is no mains voltage.	Switch on the controller or connect the controller to the mains voltage.
		Make sure that the main fuse for the mains connection is switched on.
	The controller's fuse is faulty.	If necessary, replace the controller's fuse. Use a type 2A/T fuse.
		Check the 230 V components for a short circuit. In the event of a short circuit, contact the manufacturer.
	The controller is faulty.	Contact the manufacturer.

Faults

Fault	Possible cause	Action
The pump fails to switch on.	Manual mode has been activated.	Exit manual mode.
	The preconditions for the pump to be switched on have not been met.	Wait until the preconditions for the pump to be switched on have been met.
	The temperature limit for a storage tank (95 °C) has been exceeded.	Make sure that the wiring is intact. Make sure that the system components are intact.
The pump symbol rotates without the pump actually running.	The connection to the pump has been interrupted.	Make sure that the cable connection to the pump is intact.
	The pump has seized up.	Make sure that the pump is running.
	There is no voltage at the pump output.	Contact the manufacturer.
The temperature display fluctuates strongly at short intervals.	The sensor lines have been installed close to 230 V lines.	Install the sensor lines at the greatest possible distance from the 230 V lines. Make sure that the sensor lines are shielded.
	The extensions of the sensor lines have not been shielded.	Make sure that the sensor lines are shielded.
	The controller is faulty.	Contact the manufacturer.

14 Technical data


Autonomous electronic temperature difference controller, continuous operation	
Housing material	100% recyclable ABS housing
Dimensions L x W x D in mm	176 × 162 × 44
Protection class	IP30 according to DIN 40050, EN 60529
Operating voltage	AC 230 voltage, 50 Hz, -10 to +15%
Power consumption	< 2 W
Max. line cross-section for 230 V connections	2.5 mm ² finely stranded/single core
Inputs S1–S6 (protected by varistors)	For temperature sensors PT 1000 (1 kΩ at 0 °C)
Input S0	For radiation sensor type PSF
Other inputs	VFS (Vortex flow sensor) DFG (Impeller flow sensor) Minimum measurable flow: 20 litres/min Maximum measurable flow: 72,000 litres/hour
Measuring range (temperature)	-30 °C to +250 °C
Interfaces	RS 485 for ProBus
Output R1–R3	Electronic semiconductor relay (Triac) with zero-cross switch, opto-decoupled, 230 V AC, 50 Hz, min. 10 mA, max. 150 W, with $\cos \varphi \geq 0.9$
Total output of all outputs	Max. 300 W
Output R0	Relay, potential-free normally open contact, max. 250 V AC / 1 A, also suitable for protective extra-low voltage
Control output for HE pump	PWM signal: 1kHz, $V_{iL} < 0.5$ V DC, $V_{iH} > 9$ V DC, 10 mA max. Analog signal: 0 - +10 V DC +/- 3%, 10 mA max.
Display	Backlit LCD display
Type 1 action	Type 1.B and type 1.Y
Software class	A

Autonomous electronic temperature difference controller, continuous operation	
Protection	Microfuse TR 5 type 372, 2 A/T (2 ampere, slow)
Ambient temperature	0 to +40 °C
Storage temperature	-10 to +60 °C

15 Accessories

The following accessories are available for this controller:

- microSD card
- conviso software
- conexio web module

 Use only microSD cards from the manufacturer. The manufacturer cannot provide a guarantee that any other microSD cards will work.

The conviso software allows you to display the data stored on the microSD card on a standard commercially available PC. The conviso software can be downloaded from the manufacturer's website.

The conexio web module allows you to display the controller's data on another system (monitoring) via the Internet. In addition, it allows you to operate the controller from another system (remote control) via the Internet. The conexio web module can be obtained from the manufacturer.

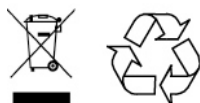
The following accessories are available for the solar power system:

- Temperature sensor PT1000
- Output measurement set (incl. pipe contact sensor)
- Sensor connection box (additional surge protection against indirect lightning)
- Immersion sleeves.

16 Disposing of the controller

The environmentally-friendly disposal of electronic assemblies, recyclable materials and other unit components is regulated by national and regional laws.

- Contact the competent local authority for detailed information on disposal.
- Dispose of lithium batteries in accordance with the statutory regulations.
- Dispose of all components in accordance with statutory regulations.



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